RESEARCH CALL TO DOE NATIONAL LABORATORIES

RESEARCH AND DEVELOPMENT ACTIVITIES TO SUPPORT SOLID STATE LIGHTING CORE TECHNOLOGIES

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ISSUE DATE: March 5, 2004
DUE DATE: April 22, 2004

TABLE OF CONTENTS

SECTION 1 – GENERAL INFORMATION

1.0 SUMMARY

The Department of Energy (DOE), National Energy Technology Laboratory (NETL), on behalf of the Office of Energy Efficiency and Renewable Energy's (EERE) Building Technologies Program (BT), is seeking proposals for applied research in the Solid State Lighting (SSL) Core Technologies Program. DOE has set aggressive and ambitious goals for SSL Research and Development: By 2015, to develop advanced solid state lighting technologies that, compared to conventional lighting technologies, are much more energy efficient, longer lasting, and cost-competitive. The objective of the present Laboratory Call is to support applied research in certain key technical areas by fostering a collaborative atmosphere favorable to overcoming the significant, although not impossible, technical challenges that restrict the application of SSL today to only relatively low luminous output products.

Lighting Research and Development Program

Mission:
To increase end-use efficiency in buildings by aggressively researching new and evolving lighting technologies, in close collaboration with partners, to develop viable methodologies that have the technical potential to conserve 50% of electric lighting consumption by 2010.

To address these issues and to advance energy conservation in lighting in US Buildings, the DOE's Building Technologies Program maintains a Lighting Research and Development (LR&D) activity. Key to the objectives of this activity is its mission statement.

To insure that its research portfolio meets critical and evolving needs in a timely fashion, the LR&D activity has and continues to host industry-led efforts to develop and maintain a series of technology road maps for the various technologies that comprise the lighting business. While not the only lighting technology of interest within the Building Technology Program portfolio, SSL is the **singular** focus of this Laboratory Call. SSL has been the focus of five discrete road-mapping exercises during the past three years. The most recent event was held in November, 2003. It was successful in prioritizing the applied research areas described in this Laboratory Call. These technical priorities and need areas are outlined in Section 3.0, "Program Areas of Interest." Information developed for and by this workshop may be viewed and downloaded at http://www.netl.doe.gov/ssl/. Workshops like this one are planned in the future and will help to align Government SSL R&D directions with the high-priority needs identified by industry.

The SSL portfolio has developed a specific statement of objectives tailored to the aggressive needs suitable for general illumination applications. It targets aggressive performance goals that, if met and successfully deployed into the marketplace, will achieve the energy conservation goals of the LR&D program while meeting or exceeding the performance attributes of electric light that allows for direct comparison to natural sunlight spectra.

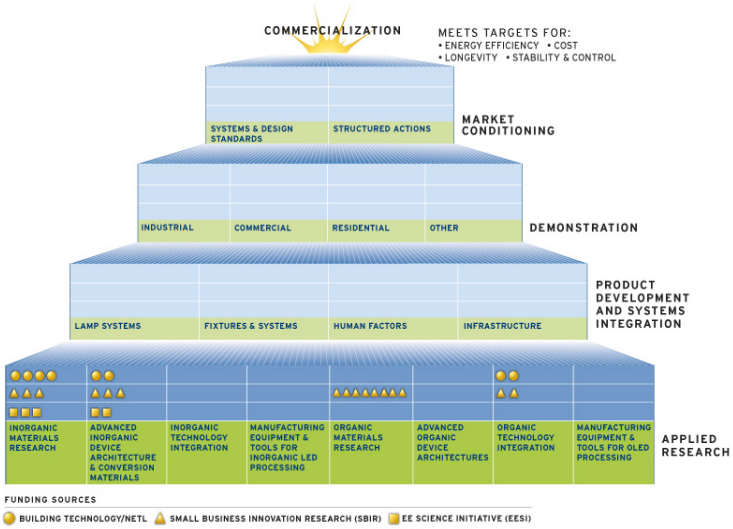

Figure 1 - Pyramid Schematic Representation of the DOE's Solid State Lighting Portfolio

The present Laboratory Call is the first in a series that may span the next decade. As the relevant SSL technology base matures, it is anticipated that the level of technology maturation will advance from the present level, applied research, eventually to market conditioning once the targets for efficiency, cost, longevity, stability and control are demonstrated in a product environment. This sequence of technology maturation is illustrated graphically in Figure 1.

Resulting in part from the November, 2003 meeting, EERE will conduct a series of actions to complete or support the completion of the levels of the pyramid. One action, running concurrently to this Laboratory Call, will be to competitively select a group (referred to as the SSL Partnership) that

broadly represents the SSL manufacturing industry. It is envisioned that, among other things, the Partnership will provide input and prioritization of future Core Technology needs. The Government will enter into a Memorandum of Agreement with the selected Partners since no Federal funding will be provided for the Partnership action. This Laboratory Call seeks proposals in an attempt to address the crosscutting or technology gap needs, benefiting multiple technology platforms and manufacturers. A Funding Opportunity Announcement will run concurrently with this Laboratory Call to also address the Core Technologies. Lastly, EERE, at a later time this Fiscal Year, intends to release a solicitation for Industrial Product Development to support the development of marketable, energy efficient products. Also, it is the intent of DOE to seek an "exceptional circumstance" to the Bayh-Dole Act, ensuring that any intellectual property developed under the Core program will be offered to the product development organizations and the SSL Partnership Group with a non-exclusive license.

Current information about the DOE's SSL portfolio can be found at http://www.netl.doe.gov/ssl/

A summary report, titled "Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report", detailing the SSL workshop can be found at http://www.netl.doe.gov/ssl/

Information about advanced building technologies, systems and partnership opportunities that promote energy efficiency, renewable energy and pollution prevention is at http://www.eren.doe.gov/buildings/

2.0 OBJECTIVES

The specific focus of this Laboratory Call is to ensure that the LR&D portfolio of SSL technology sufficiently addresses the Core Technologies that can be readily and widely applied to existing and future lighting products, which in turn will be energy efficient and cost competitive. It is in this collaborative atmosphere that proposals are sought; proposals that are truly innovative and groundbreaking, fill technology gaps, provide enabling knowledge or data, and will represent a significant advancement in the SSL technology base.

The overall objectives of the SSL portfolio span four broad categories as is illustrated in the Pyramid Schematic in Figure 1. **The present Laboratory Call covers only applied research**, the foundation that the rest of the SSL portfolio is built upon.

Many of the needs identified in Section 3.0 , "Program Areas of Interest" are described in terms of applied research objectives. Ordinarily, these descriptions are associated with products or a specific product vision. Due to the perceived early stage of SSL portfolio, such advanced descriptions are not possible. Progress towards meeting many of the specific needs in Section 3.0 can be made by advancements in enabling technology or basic knowledge and information.

For the purposes of this Laboratory Call, research to produce generic technology, knowledge and information is considered not to be applied research as defined below. Such "basic research" is specifically excluded in this Laboratory Call. Therefore, the technology maturation stage eligible for this Laboratory Call is limited to Stage 2 only.

> **Technology Maturation Stage 2 - Applied Research -** Scientific principles are demonstrated, an application is identified, and the technology shows potential advantages in performance over commercially available technologies. Lab testing and/or math modeling is performed to identify the application(s), or provide the options (technical pathways) to an application. Testing and modeling add to the knowledge base that supports an application and point to performance improvements.

3.0 PROGRAM AREAS OF INTEREST

There are six specific Areas of Interest for this Laboratory Call that were identified in the SSL Workshop of November, 2003 as high priority applied research areas. Proposals must select and target only one (1) Area of Interest per proposal. A separate proposal must be submitted for each technology or technical approach targeted under a single area of interest. Any single proposal that offers two or more technologies or technical approaches will be rejected without discussion and will not be evaluated for funding.

Proposals from the same laboratory that appear nearly identical (e.g. different only to the extent of operational or experimental variations) will be rejected, with one retained as representative of the group. This applies whether the proposals are in one Area of Interest or multiple Areas of Interest. The single proposal retained for evaluation will be evaluated in the Program Area of Interest determined to be most appropriate.

The Areas of Interest target innovations in both Light Emitting Diodes (LED) and Organic Light Emitting Diodes (OLED). Descriptive information on each of these six Areas of Interest is provided in the following paragraphs:

LED

Area of Interest 1: High efficiency visible and near UV (>380 nm) semiconductor materials for LED based general illumination technology

Current nitride compound semiconductors are incapable of achieving the price and performance targets that are competitive in general illumination applications for a variety of reasons. While significant improvements have been made, today's products are not able to meet these requirements primarily due to limitations in materials and packaging. Also, a complete basic understanding of how material quality ultimately affects device performance is still lacking. Significant advancements in the basic materials technology associated with visible and near UV LEDs are required to advance performance characteristics of current devices beyond their present limitations of 50 to 80 LPW. These advancements must not only produce the substantial gains in the light production efficiency required, but must also address the significant costs normally associated with the complex and labor intensive epitaxial growth required to produce these devices. Applied research in conventional nitride systems and exploration of novel material systems is necessary to produce the efficient materials system(s) required for general illumination challenges. Improvements by several orders of magnitude to the price and performance of these devices are vital to make them practical solutions. Also, advancements in P-doping efficiency and novel charge introduction structures may produce significant fundamental advancements in existing materials systems. Advancements in high purity process materials and growth structures may also significantly improve device performance by limiting photon inhibiting processes thought to be associated with defects, dislocations, and other crystalline artifacts.
[For more information, refer to SSL research topic 1.1.2 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

Area of Interest 2: Advanced architectures and high power conversion efficiency emitters

Advanced device architectures that optimize both electrical transport and optical properties will be needed to achieve longer-term efficiency goals in excess of 160 lumens/Watt and consequently, meaningful energy savings. Traditional LED designs will rely on novel fabrication methods, including chip-shaping, texturing, laser liftoff, etching, and novel metallization for improved efficiency. More advanced light emitting designs that might include micro cavities, photonic lattices, quantum dots, edge-emitting and vertical-cavity laser structures are sought under this area. Fundamental advancements and novel innovations associated with chip-level architectures and high power conversion efficiency are believed by many to be the key to production of significant increases in power handling capability. Applied research directed at novel chip scaling, producing practical and cost efficient multi-color chips, or resonant cavity devices such as lasers or directional emitters may each produce the desired increases in power capability. Also, for conventional chip designs, the dimensions and locations of contacts are limiting and as chips become larger and of greater power handling capacity, development of novel contact materials and geometries will become increasingly important.
[For more information, refer to SSL research topic 1.2.1 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

Area of Interest 3: High temperature, efficient, long-life phosphors, luminescent materials for wavelength conversion and encapsulants

Near term SSL general illumination products are expected to be designed around near UV or blue emitting LEDs that capture a portion of their monochromatic emissions with a yellow phosphor that in turn converts some of the pump radiation into a broader spectrum, whose combined emissivity approximates white light of good color and spectral power. Although many materials that are currently used for these purposes are reasonably efficient, even

more efficient phosphors and/or luminescent materials may bring an immediate increase in device efficiency. For example, multi-photon processes can produce quantum yields in excess of unity even for relatively low energy excitations such as 380 nm. Suitable hosts and materials systems need to be developed to advance these to practical, energy efficient devices for general illumination products. Applied research is sought in this area that investigates novel phosphors and/or luminescent material synthesis and blends.

Within down-conversion approaches to white light generation, more efficient (>95%), stable (100,000 hrs), high-temperature (>150 °C), environmentally friendly phosphors with no dissipative optical absorption or scattering will need to be developed. Novel approaches are also needed and sought for the synthesis and processing of novel conversion materials, including, but not limited to nanocrystalline semiconductors, photonic lattices, quantum dots, organic coordination-compound phosphors, phosphor blends or slurries, and coated phosphors.

High-drive, high-lumen output LED devices place demanding performance requirements on encapsulation materials. Future encapsulation materials for high-power general illumination products will need to have an index > 1.6, high transmission (>80%) through thick layers throughout the visible spectrum (440-650 nm), UV filtering and resistance, low H2O permeability for up to 100,000 hours, and withstand high processing and operation temperatures (100-150 °C). New approaches and materials are sought.
[For more information, refer to SSL research topic 1.2.2 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

OLED

Area of Interest 4: High efficiency, low-voltage, stable materials for OLED-based general illumination technology (hosts, dopants, and transport layers)

Today, OLEDs designed for general illumination purposes may be derived from those normally associated with display applications. This is not ideal as general illumination OLEDs have unique price and performance requirements that will allow them to perform as viable alternatives to conventional luminous sources. To evolve into this new performance domain, applied research in novel materials hosts, alternative dopants, and advancing a more comprehensive understanding of the role and design rules for charge transport in layers is sought.

Current OLED materials simply do not have the efficiency or lifetime performance necessary to qualify them as viable candidates for the demanding general illumination market. Estimates of lifetime and efficiencies necessary for OLED based general illumination are roughly 50,000 hours and 100 lumens/Watt respectively. Lifetime and efficiency of state-of-the-art white OLEDs (at 850 cd/m^2) are about 500 hours and 5 lumens/Watt respectively. To realize the full potential of OLED technology, new materials and systems are needed that offer the promise of vastly improved efficiency and stability in the active regions of the OLED device- cathode and anode layers, electron and hole transport and injection layers, emission layers, and carrier blocking layers. New phosphorescent OLED systems with nearly 100% internal quantum efficiency at high current densities are required in the red, green, and blue spectral regions. Single molecules that produce a broadband emission and that harvest triplet energies otherwise lost as heat are also needed. Innovative device structures and materials are needed to reduce high-luminance (~1000 cd/m^2) drive voltages from 10-20V to 4-5V. Compatibility with practical methods of current distribution and controls must be assured.

This topic specifically addresses the development of novel materials that might be used to create high efficiency, low voltage, stable OLEDs with improved internal quantum efficiency (IQE). Novel methods of extracting light or alternative light management approaches that produce higher external quantum efficiency (EQE) from existing materials systems and structures are sought under Area of Interest 5. Likewise, novel device designs that may produce increases in IQE and EQE are sought under another Area of Interest 6.
[For more information, refer to SSL research topic 1.5.1 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

Area of Interest 5: Strategies for improved light extraction and manipulation

Significant advancements in OLED device performance will require applied research leading to alternative strategies for light extraction and optical management. Conventional limits on OLED out coupling efficiency is exceptionally low producing damaging heat instead of useful photonic emissions. Research in this area could include advanced modeling or exploration of novel geometries that promise to achieve 50% or more light extraction efficiency.

Current light out-coupling efficiencies are on the order of 20%. Innovative approaches utilizing surface texturing, gratings, periodic nanostructures, integrated lens or device shaping are necessary to increase the out-coupling efficiency to the desired level of >50%. Even the basic configurations and accepted practice of layering OLED structures may need to be reexamined to ascertain if the ideal geometry is possible. Other novel methods to increase device extraction efficiency like designing for some level of cavity resonance or mode structure may hold promise. With the internal quantum efficiency of basic OLED materials systems already approaching 90%, significant advancements in light extraction efficiency or external quantum efficiency (EQE) holds considerable promise. Proposals to this Area of Interest may be theoretical, modeling oriented or experimental but all should represent novel approaches that offer the potential for large increases in performance, not just incremental increases in EQE.

This area of interest is restricted to applied research that promises a breakthrough in external quantum efficiency (EQE) commensurate with the criteria provided above. Proposals that address small, incremental increases in EQE are not of interest. Proposals representing increases in materials IQE are sought under Area of Interest 4 and proposals for novel device structures and materials systems are sought under Areas of Interest 6.
[For more information, refer to SSL research topic 1.6.1 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

Area of Interest 6: Novel device structures for improved performance and low cost

Practical OLED devices for general illumination applications must perform in extreme environments very different than those normally associated with today's OLEDs such as display applications like cell phones and PDAs. For the realization of the SSL market penetration sought, OLEDs must be developed that will perform at remarkable brightness levels for periods measured in tens of thousands of hours at extreme temperatures, with no degradation in luminous performance. Thus, applied research directed at meeting these challenges is sought that will ultimately give rise to the OLED packages that are as reliable and long lived as required for general illumination applications. Applied research in this area may include novel materials and hosts that help to achieve these goals but may also include innovations associated with existing materials systems and structures.

As the internal efficiency and stability of new OLED materials improves, OLED researchers will need to focus their attention on novel device architectures. This is especially important for maximizing light extraction (as above) but may be just as important for manufacturing cost reductions or for adding additional functionality such as pixilation or variable light attenuation. Equally important and perhaps nearer term are new ideas in the area of white OLEDs to improve the color stability over time and operating conditions. Concepts including RGB blends, monomer-excimer complexes, separate RGB emissive layers, and pixilation need to be explored to determine the optimal approach to OLED-based white light generation.

This area of interest is restricted to advancement of completely novel materials systems such as hybrid inorganic-organic ones and/or novel architectures such as multiple emissive layers or resonant cavity structures. Proposals that seek to advance IQE of known materials systems should be submitted to Area of Interest 4, provided that the performance criteria specified are met. Likewise, proposals that promise to increase the EQE of known architectures and structures should be submitted to that Area of Interest 5 provided the respective performance criteria for that area are satisfied.
[For more information, refer to SSL research topic 1.6.2 of Illuminating the Challenges: Solid State Lighting Portfolio Planning Workshop Report at http://www.netl.doe.gov/ssl/]

SECTION II: REQUIREMENTS AND ELIGIBILITY

4.0 ELIGIBLE APPLICANTS

All DOE National Laboratories are encouraged to submit proposals in response to this Laboratory Call.. For-profit, non-profit, state and local governments, Indian Tribes, and institutions of higher education are not eligible for this Laboratory Call, but are encouraged to submit proposals to the companion Funding Opportunity Announcement (DE-PS26-04NT42092) at https://e-center.doe.gov/iips/faopor.nsf/8df825feb86675de852564650046faea/4f7967171740b7c885256e46004fce4a?OpenDocument. Teaming with other National Laboratories is acceptable if this teaming leads to a greater likelihood of achieving the goals of the SSL program in a timely fashion.

5.0 TYPE OF AWARD INSTRUMENT

Any project awarded as a result of the Laboratory Call will be processed through the NETL Financial Management Office as a Field Work Proposal, an Interoffice Work Order or any other allowable method deemed appropriate by the Government.

6.0 ESTIMATED FUNDING

Approximately $6 million dollars is expected to be available for new awards under this laboratory call, funded over multiple government fiscal years.

7.0 EXPECTED NUMBER OF AWARDS

DOE anticipates making approximately 3-6 awards this fiscal year under this announcement. However, the Government reserves the right to fund, in whole or in part, any, all, or none of the proposals submitted in response to this laboratory call and will award that number of instruments which serves the public purpose and is in the best interest of the Government. In addition, the Government reserves the right to make "conditional selections" in the event that future funding should become available.

8.0 ESTIMATED AWARD SIZE

DOE estimates that awards are not to exceed the following. However, applicants are not encouraged to try to equal these estimates but should offer proposals with logical work plans and appropriate costs:

Project Period Length:	Maximum Federal Share:
12 months	$900,000
12 – 24 months	$1,800,000
24 – 36 months	$2,700,000

This information is for estimating purposes only and in no way commits the Government.

9.0 PERIOD OF PERFORMANCE

DOE anticipates making awards that will range from twelve (12) months to thirty-six (36) months. Awards will have project and budget periods that are specific to the project and funding.

10.0 EXCEPTIONAL CIRCUMSTANCES

Regarding any award made to a National Laboratory under this Laboratory Call, the Department of Energy intends to pursue a determination titled "Exceptional Circumstances Determination for Inventions Arising Under the Solid State Lighting Core Technologies Program." This Determination will be based on the Department's belief that circumstances surrounding the Solid State Lighting Core Technologies Program are exceptional and justify modified intellectual property arrangements as allowed by the Bayh-Dole Act (35 U.S.C. 202(a)(ii)).

If the Determination is approved, the Department of Energy intends that disposition of rights to subject inventions made by a National Laboratory under awards resulting from this announcement will be subject to the terms of this Determination. The restriction of patent rights under the Determination will be basically as described in the following paragraph. In developing the Determination, the Department will strive to minimize the licensing rights that the Core Technology Program recipients will have to agree to. In addition, under 35 U.S.C. § 203(2), an awardee adversely affected by this exceptional circumstance determination has a right to appeal the determination to the Department of Energy or to the United States Court of Federal Claims.

Each patent waiver granted by DOE shall contain a provision requiring the recipient to offer to each of the Solid State Lighting Industrial Product Development (i.e., SSL Partnership and SSL Industry) members the option to enter into a non-exclusive license for subject inventions developed under the Core Technologies Program, upon terms that are reasonable under the circumstances, including royalties. After a one-year period, the Core recipient will be free from the licensing restrictions. The Core recipient must agree to negotiate in good faith with any and all Industrial Product Development members that indicate a desire to obtain at least a non-exclusive license. Exclusive licensing may be considered if only one Industrial Product Development member expresses an interest in licensing the invention. Partially exclusive licenses in a defined field of use may be granted to an Industrial Product Development member, provided such license would not preclude any other Industrial Product Development member that indicates a desire to license the invention from being granted at least a non-exclusive license. In the event the Core Recipient and an Industrial Product Development member cannot reach agreement after nine months from the start of diligent and responsible negotiations between them, the Industrial Product Development member shall have the right of a third party beneficiary to maintain an action in a court of competent jurisdiction to force licensing of the subject invention on reasonable terms and conditions. The licensing of any background patents owned by the Core recipient is not required.

SECTION III: SUBMISSION INSTRUCTIONS

11.0 SUBMISSION INSTRUCTIONS

Proposals shall be submitted electronically to the following email address **no later than April 22, 2004 at 4:00 pm EST**:

Joel Chaddock, Project Manager
US Department of Energy
National Energy Technology Laboratory
Joel.Chaddock@netl.doe.gov

The applicant is encouraged to request a return notification to verify receipt of proposal.

12.0 LATE APPLICATIONS, AMENDMENTS AND WITHDRAWALS OF PROPOSALS

A proposal or amendment of a proposal shall be considered timely if it is received on or before the closing date indicated above. Proposals or amendments of proposals may be withdrawn by written notice from an authorized representative to the above address via e-mail or in writing.

A second proposal or amendment may then be submitted. The second or subsequent proposal must be submitted before the closing date to be considered. In the event that two or more proposals are received for the same project with the same title, the proposal with the latest postmark will be considered for review. Therefore, it is important that you not merely make page changes and re-submit portions of the proposal that are amended. A complete amended proposal must be sent.

Proposals or amendments received after the closing date will not be considered.

SECTION IV: APPLICATION PREPARATION

13.0 PREPARATION

It is requested that the entire proposal not exceed thirty-five (35) pages, single spaced, 1" margins (top, bottom, left, right), and when printed will fit on size 8 1/2" by 11" paper. The type must be legible and not smaller than 11 point. The Technical Content (see Section 13.4) shall not exceed twenty (20) pages of the total page limit. Evaluators will review only the number of pages specified. Any proposals exceeding these limitations may result in a weakness to their overall scored based on technical evaluation Criterion 3 – Applicant and Team Member Roles & Capabilities. In order to produce a comprehensive application for this Lab Call, the offeror shall address, at a minimum, the areas listed in the Table of Contents, below. The offeror shall use the following Table of Contents:

13.1 FIELD WORK PROPOSAL COVER SHEET

The form must be completed and signed by an official who is authorized to act for the proposer and project team members (other National Laboratories) and who can commit the proposer to comply with the terms and conditions of award, if one is issued.

13.2 PUBLIC ABSTRACT

This section shall contain a public abstract of not more than one (1) typewritten page. The offeror shall provide a point of contact for coordination, preparation and distribution of press releases. The public abstract shall not contain confidential, proprietary, or otherwise sensitive information as it may be released by the DOE to the general public at any time.

13.3 DETAILED COST ANALYSIS

The applicant shall provide detailed cost information pertaining to their proposal. At a minimum, the cost analysis shall provide information regarding personnel costs, overheads, travel, equipment, and supplies. Include a supplemental schedule that identifies the labor hours, labor rates, and cost by labor classification for each budget year. Also indicate the basis of the labor classification, number of hours, and labor rates.

13.4 TECHNICAL CONTENT

The proposer shall address with detail each of the criterion described below:

13.4.1. Technical Approach

- Provide a clear and concise statement of the scientific merits and validity of the proposed approach. Explain any areas of technical uncertainty and the basis for the approach selected.
- Include a table of milestones for each interval of the proposed effort. Be quantitative and descriptive. Typically, projects contain one to four milestones which may be accomplished in no longer than 18 months. These milestones should relate to the determination of technical "value" as described in Criterion 2.
- Provide an expanded discussion of technical approach with roles and responsibilities of participant. Provide a discussion of anticipated outcomes and results.
- Provide a discussion of how the proposed subject and approach will impact the eventual achievement of the DOE SSL mission/goal. Please refer to Section 1.0, text box "Solid State Lighting Goal."
- Describe how the technology will be made available to a cross-section of the end-user industry or other cross-cutting industries at the earliest practicable time. Include current and potential licensing strategies and a discussion of potential barriers and how they will be overcome.

13.4.2. Technology "Value"

- Explain how the proposed approach is applicable to multiple SSL technologies or may impact other DOE energy efficiency objectives (crosscutting). Examples might include SSL lighting and windows, SSL lighting and commercial buildings, etc.
- Explain the importance of the proposed work and its potential impact on eventual SSL products. If possible, estimates of lighting energy conservation should be made to help relate the importance of the proposed work to DOE energy efficiency goals.
- Explain the importance of the proposed work in terms of meeting the published statement of needs. If there are multiple areas addressed, please be complete.
- Explain how the proposed research will allow the DOE to achieve their SSL goals earlier than planned. Be quantitative and estimate the impact this achievement might have on cumulative lighting energy conservation.

13.4.3. Applicant and Team Members Roles and Capabilities

- Discuss the ability of the team to perform and achieve the goals stated in the SOPO. This should include current corporate experience and success in similar projects resulting in successful technology development and commercialization or technology transfer to commercial product(s).
- Discuss the ability of the Applicant to perform "project management" on previous projects, Federal or non-Federal. The Proposer, or "Prime," is expected to perform a major portion of the effort for this work. (Minimal participation by the Prime may negatively demonstrate overall project management ability.)
- Provide a breakdown of key personnel to SOPO tasks (manpower matrix). The matrix should illustrate estimated labor hours and labor categories (e.g., project manager, principal investigator, etc.) required for each task and shall provide rolled-up total for each period. The same should also be included for any proposed subcontracting or consulting efforts. Discuss the rationale used to develop estimates for labor hours and categories, and subcontracting/consulting efforts.
- Discuss the availability of facilities and equipment. Identify any major equipment needed for the proposed project which will need to be acquired during the course of the project.

13.4.4. Previous or On-going Related Work

- Describe any linkages to current Federal programs (i.e., DOE, DARPA, DOD, NIST, etc.) and any leverage that may be relevant.
- Discuss if the proposed work will be integrated into any products. Please explain how, which ones and when.

13.5 STATEMENT OF WORK (APPENDIX A) INSTRUCTIONS

A Statement of Work shall be developed that addresses how the project objectives will be met. The Statement of Work must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. This section shall be restricted to 1-3 pages in length. The Statement of Work may be released to the public by DOE in whole or in part at any time. It is therefore required that it shall not contain proprietary or confidential business information.

TITLE OF WORK TO BE PERFORMED

(Insert the title of work to be performed. Be concise and descriptive.)

A. OBJECTIVES

Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED

Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project. This section provides a brief summary of the planned approach to this project.

PHASE I

Task 1.0 - (Title)

(Description)

Subtask 1.1 (Optional)

(Description)

Task 2.0 - (Title)

PHASE II (Optional)

Task 3.0 - (Title)

D. DELIVERABLES

The Recipient shall provide a list of deliverables. These reports shall be identified within the text of the Statement of Work. See the following examples:

1. Task 1.1 - (Report Description)
2. Task 2.2 - (Report Description)

The Recipient shall submit to the DOE Project Manager annual technical progress reports. The reports are due thirty (30) days after the calendar year. In addition, the Recipient shall submit the following:

Monthly Highlight Communications: This update shall be submitted via e-mail no later than the 15th day of each month and shall cover the activities of the previous month. Recipients shall use this highlight opportunity to communicate developments, achievements, changes and problems. The information shall be submitted in accordance with the following format:

Award Number
Title
Communication Period – Identify month and year of the communication period.
Task Update – Provide an update on work performed for each task during the period. Identify tasks by both the descriptive name and number.
Quarterly Expanded Summary - Monthly Highlight Communications for December, March, June, and September shall include an expanded summary of project results and the current status of all project tasks. This summary shall be in sufficient detail to place the information communicated in the Monthly Highlight Communications for the current month and preceding two months in the context of the full project.
Discussion Topics – Identify issues that require DOE Project Manager attention or action.
Key Milestones and Significant Accomplishments – In a short paragraph per milestone or accomplishment, identify achievement of key project milestones, noteworthy advancements in research, design, manufacture or commercialization activities of the project, patent-related developments, and important breakthroughs that resolve critical science and technology risks or development barriers.
Presentations & Publications – Identify and include briefing packages, press releases, articles, and papers planned, developed and/or given that discuss the project. [Note: Copies of these presentations and publications provided with the Monthly Highlight Communication shall not include proprietary information.]
Site Visits – Identify site visits planned and given with high level corporate or government officials.
Travel – Identify travel planned or completed to accomplish/manage project tasks.

E. BRIEFINGS/TECHNICAL PRESENTATIONS (If applicable)

The Recipient shall prepare detailed briefings for presentation to the DOE Project Manager at the DOE Project Manager's facility located in Pittsburgh, PA or Morgantown, WV. Briefings shall be given by the Recipient to explain the plans, progress, and results of the technical effort.

The Recipient shall provide and present a technical paper(s) at the DOE/NETL Annual SSL Review Meeting to be held at the NETL facility located in Pittsburgh, PA; Morgantown, WV; or other location specified by the DOE Project Manager.

SECTION V: EVALUATION AND SELECTION

14.0 INITIAL REVIEW CRITERIA

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the Laboratory Call.

15.0 MERIT REVIEW CRITERIA

Proposals submitted in response to this funding opportunity will be evaluated and scored in accordance with the criteria and weights listed below:

1. TECHNICAL APPROACH (CRITERION 1) – 40%

   - Validity of the proposed approach, the likelihood of success, and the scientific merit of the key technology issues addressed.

   - Technical realism and likelihood of success of the proposed technical milestones for each interval of the effort.

- Feasibility of the proposed Statement of Project Objectives (SOPO) and the anticipated outcomes and results; validity of the proposed roles and responsibilities of each participant.

- The extent to which the proposed project will contribute to the eventual achievement of DOE's SSL mission and/or goal.

2. TECHNOLOGY "VALUE" (CRITERION 2) – 30%

   - The extent to which the proposed approach will contribute to multiple SSL technologies or how it may positively impact other DOE energy efficiency objectives (crosscutting).

   - The importance of the proposed work and its potential impact on eventual SSL products.

   - The degree to which the proposed work meets the published statement of needs.

   - Feasibility of the proposed work allowing DOE to achieve the SSL goals earlier than planned.

   - The feasibility of the proposed technology dissemination to a cross-section of end users and the proposed licensing strategies and plans to overcome any licensing barriers.

3. APPLICANT AND TEAM MEMBERS ROLES AND CAPABILITIES (CRITERION 3) – 20%

   - Adequacy of the proposed team's abilities to achieve the goals stated in the SOPO.

   - Demonstrated abilities to successfully perform project management functions on previous programs, Federal or non-Federal.

   - Reasonableness of time allocations outlined in the manpower matrix; effectiveness of the proposed roles and responsibilities of outlined personnel.

   - The adequacy (quality, availability, and appropriateness) of facilities and equipment to accommodate the proposed project.

4. PREVIOUS OR ON-GOING RELATED WORK (CRITERION 4) – 10%

   - Linkages to current Federal Programs (i.e., DOE, DARPA, DOD, NIST, etc.) and any leverage that may be relevant.

   - Feasibility of potential benefits the proposed work has with anticipated products.

16.0 OTHER SELECTION FACTORS

These factors, while not indicators of the Proposal's merit, e.g., technical excellence, cost, Applicant's ability, etc., may be essential to the process of selecting the proposal(s) that, individually or collectively, will best achieve the program objectives. Such factors are often beyond the control of the Applicant. Applicants should recognize that some very good proposals may not receive an award because they do not fit within a mix of projects which maximizes the probability of achieving the DOE's overall research and development objectives. Therefore, the following factors may be used by the DOE to assist in determining which of the ranked proposal(s) shall receive DOE funding.

1. It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;

2. It may be desirable to support complementary and/or duplicative efforts or projects, which, when

taken together, will best achieve the research goals and objectives;

3. It may be desirable, because of the nature of the energy source, the type of projects envisioned, or limitations of past efforts, to select a group of projects with a broad or specific geographic distribution;

4. It may be desirable to select project(s) of less technical merit than other project(s) if such a selection will optimize use of available funds by allowing more projects to be supported and not be detrimental to the overall objectives of the program.

The above factors will be independently considered by the DOE in determining the optimum mix of proposals that will be selected for support.